Reconnaissance Study
Columbia River Channel Deepening
Water and Sediment Quality
November 1990 [1]

Measures of water quality parameters for priority pollutants tested in the lower Columbia River show values less than the concentration standards set by the Oregon Department of Environmental Quality (DEQ) for the Columbia River. Dissolved solids range from 75 to 112 mg/l; the DEQ standard's 200 mg/l. Below Portland, the dissolved solids content shows a slight decrease because of the dilution effect of tributaries.

Sediment samples for chemical (dioxin/furan and TOC) and physical (grain size and volatile solid) analyses were collected within the proposed channel alignment at various locations along the lower Willamette River (WR) and Columbia River (CR) between May 3, 1990 and May 18, 1990. Sediment samples were collected from 5 general reaches of the two rivers using a Benthos gravity corer . These reaches included Portland Harbor Area (RN 4+10 to RN 11+00) on the Willamette River and Camas (RN 118+26), St. Helens (RN 85+45), Longview (RN 63+00 to RN 65+40) and Wauna (RN 38+00 to RN 43+05) on the Columbia River. Sample locations were chosen from within the project boundaries including the channel and sideslopes where dioxins/furans would be expected to be located if present in the
sediments. Along the Columbia River the sample locations were near discharges from pulp and paper mills. In the Willamette River, sample locations were chosen from general shoal areas or where previous sampling had indicated the presence of similar hydrophobic organic compounds (i.e. PCBs, PAHs, pesticides) and where previous analyses by DEQ indicated that dioxins/furans were present.

All samples collected were physically analyzed for grain size and volatile solids. Sediment samples from the Columbia River (those marked CR-... in Table 1) generally range in median grain size from coarse sand to coarse silt. The three (3) notable exceptions to this are CR-GC-2, CR-GC-5 and CR-GC-6 whose median grain size are between a medium to fine silt. Samples CR-GC-2 (from the sideslope of the channel adjacent to the Longview anchorage) and CR-GC-6 (taken from the sideslope of the navigation channel) also show some of the highest percentages of volatile solids and TOC of the samples collected including most of those on the Willamette River. The material was fine grained, stiff and had black to yellowish plant material which ran vertically with the core not in horizontal depositional layers. Further studies are needed for verification, but it is most likely that these samples represent old shallow marsh deposits as they could not have been deposited under the present environmental conditions at the site. The other Columbia River samples have low volatile solids and TOC (less than 1.5% and 1.2% respectively) which are typical of clean sand. Due to the coarseness of the material encountered at those locations so indicated in the table, representative samples of the bottom material could not be collected with the gravity corer therefore analyses could not be conducted.

Sediment samples from the Willamette River (those marked WR-... in Table 2) have median grain sizes in the coarse to medium silt range with the exception of WR-GC-8 which is a fine sand taken from the center of the channel. Volatile solids range from 3.5% to 10.0% while TOC

ranges from 0.90 to 4.0 percent. TOC was lowest in the two (2) cores taken from the center of the channel.

A total of nineteen (19) samples or composites were analyzed for the presence of dioxins/furans using combined capillary column gas chromatography/high resolution mass spectrometry (HRGC/HRNS) monitoring five groups of selected ion masses as described in EPA method 8290. These five groups correspond to the tetrachloridated through octachloridated congener classes. Each group contained three (3) ion masses for dioxin (with the exception of TCDD which contained two (2) ion masses), two (2) ion masses for the furans, the corresponding ion masses from two (2) isotopically internal standards and the ion mass characteristic of the polychlorinated diphenylether (PCDPE) which, if present, could cause false responses in the dibenzofuran channels. The third dioxin mass monitored in the pentachloro- through octachlorodibenzo-p-dioxin groups prevent the possibility of misinterpretation of a polychlorinated biphenylene (PCB) isomer as a dioxin. The two (2) ion masses monitored for TCDD also fulfilled this purpose. The mass spectrometer was operated in the electron impact ionization mode at a mass resolution of 10,000-11,000 (N/ N, 10 percent valley definition). This resolution is sufficient to resolve most interferences, such as PCBs, thus providing the highest level of confidence that the detected levels of dioxin/furan are not false positives resulting from interferences. In addition, a laboratory method blank using a clean sand was prepared and processed along with each extraction batch (10 samples) as part of the QC/QA procedure. The results of these analyses are presented in Table 3. Negative numbers indicate detection limits for nondetected isomers while ND stands for None Detected.

All of the samples with WR prefixes, with the exception of WR-GC4, were found to contain polychlorinated diphenylethers (PCDPEs), substances which can cause false positive responses for PCDFs. Those PCDF responses having a simultaneous response in the PCDPE ion trace were not included in the quantifications due to the possibility that the furan was an artifact produced from the diphenylether. The reported detection limits for the affected 2,3,7,8-substituted isomers in the samples are, therefore, elevated.

Comparison of the test results with the appropriate laboratory method blank show that CR-GC-4(EPA), CR-GC-5, CR-GC-15, CR-GC17&18, CR-GC-23&24 and CR-GC-25&26 have levels of the affected isomers that were comparable to those found in the blank (background levels). Additionally, the levels determined for the affected furan isomers in sample CR-VC-12A&12B may also have originated from the background.

Though various isomers of dioxin/furan were detected in all of the samples tested many of the individual isomer concentrations found in the Columbia River samples can be attributed to background levels in the analytical system. In addition concentrations found in samples from the Columbia River are orders of magnitude below those found in the Willamette River samples. The isomer 2,3,7,8-TCDD was confirmed in only two (2) of the twenty (20) analyses; WRGC-4 at 0.63 pptr and WR-GC-7Rep at 0.62 pptr. The associated furan isomer, 2,3,7,8-TCDF, was detected at concentrations ranging from a low of 0.73 pptr (WR-GC-7) to a high of 110.0 pptr (WR-GC4) in the Willamette River samples. WR-GC-4 was collected from the Doan Lake area where contamination of DDD, DDT and PAHs have been noted in the past.

Table 4 presents the data in the form of 2,3,7,8-TCDD toxicity equivalence. The numbers are derived by multiplying the detected concentration by its appropriate toxicity equivalency factor (TEF 1989) and correcting for the detected background concentrations.

Most of the research with regard to dioxins/furans has concentrated on the "bad actor" 2,3,7,8-TCDD and little or no information exists on the other congeners. It is generally accepted that the higher weighted dioxins/furans are not as readily taken up or bioaccumulated by organisms and are less toxic. These higher weighted dioxins/furans occur naturally as combustion byproducts from such things as forest fires and wood stoves.

In the Columbia River, from the results of our preliminary investigation, significant dioxin/furan contamination of the sediments within the Columbia River portion of the project is not evident. In the Willamette River, though 2,3,7,8-TCDD and the lower weighted dioxins were found only at low levels, the higher weighted less toxic dioxins and the furans are significantly elevated above background. Further testing and evaluation will be required in this area. Analyses need to be expanded to include other contaminants of concern as well as biological effects based evaluations.

1. The above information is an excerpt taken from the November 1990 Columbia River Channel Deepening Reconnaissance Study, pages D-2 through D-9.

TABLE 1: COLUMBIA RIVER SEDIMENT SAMPLE PHYSICAL PROPERTIES

	LOCATION				PHYSICAL PROPERTIES		
SAMPLE SITE	RIVER MILE	L	C	R	MEDIAN GRAIN SIZE(mm)	% FINES	VOL. SOLIDS
CR-GC-1	65+40			X	See Note		
CR-GC-2 *	64+00			X	0.0095	89.1	11.0
CR-GC-3	64+00		X		See Note		
CR-GC-4(EPA) *	64+00	X			0.16	3.3	0.7
CR-GC-5 **	63+00			X	0.016	91.9	5.5
CR-GC-6 *	63+00	X			0.0086	92.1	9.6
CR-GC-7	63+00		X		0.58	0.8	0.9
CR-VC-9	43+05	X			0.085	39.4	0.5
CR-VC-10	43+05	X			0.084	39.7	0.5
CR-VC-11	43+05	X			0.052	70.6	1.4
CR-VC-12A **	43+05	X			0.032	91.5	1.3
CR-VC-12B **	43+05	X			0.059	66.5	1.4
CR-VC-13	43+10			X	0.29	1.5	0.6
CR-VC-14	43+10			X	0.3	1.5	0.6
CR-GC-15 *	41+00		X		0.38	0.3	0.5
CR-GC-16 *	41+00	X			0.39	0.4	0.5
CR-GC-17 *	39+35			X	0.5	0.3	0.6
CR-GC-18 *	39+21			X	0.3	0.9	0.4
CR-GC-19	38+00		X		See Note		
CR-GC-20	38+00	X			See Note		
CR-GC-21	38+00			X	See Note		
CR-GC-23 **	85+45	X			0.33	0.3	0.5
CR-GC-24 **	85+45	X			0.34	0.4	0.5
CR-GC-25 **	118+25			X	0.44	0.5	0.7
CR-GC-26 **	118+26			X	0.32	0.4	0.8
MINIMUM					0.0086	0.3	0.4
MAXIMUM					0.58	92.3	11
MEAN					0.23	29.57	1.93

Note: Unable to collect sufficient gravity core sample due to coarseness of material.
*, **: Samples run with Method Blank 1(*) and Method Blank 2 (**), respectively (Table 2).

TABLE 2: WILLAMETTE RIVER SEDIMENT SAMPLE PHYSICAL PROPERTIES

	LOCATION				PHYSICAL PROPERTIES		
SAMPLE SITE	RIVER MILE	L	C	R	MEDIAN GRAIN SIZE(mm)	% FINES	VOL. SOLIDS
WR-GC-2 **	4+13	X			0.023	78.30	6.50
WR-GC-3A *	6+35			X	0.015	88.20	8.40
WR-GC-3B *	6+35			X	0.014	87.60	10.00
WR-GC-4 **	7+12	X			0.02	88.40	7.60
WR-GC-5 *	9+00	X			0.031	67.00	6.90
WR-GC-6 *	9+00		X		0.048	63.30	5.80
WR-GC-7 **	9+50			X	0.037	70.30	5.20
WR-GC-7Rep **	9+50			X	0.037	70.30	5.20
WR-GC-8 *	10+00		X		0.15	19.00	3.50
WR-GC-9 *	9+50	X			0.062	55.50	6.40
WR-GC-10 **	11+00	X			0.028	76.10	7.80
MINIMUM					0.014	19.00	3.50
MAXIMUM					0.15	88.40	10.00
MEAN					0.04	69.45	6.66
* METHOD BLANK	BATCH 1 8/08/1990				NOT AVAILABLE		
** METHOD BLANK	BATCH 2 7/23/1990				NOT AVAILABLE		

*, **: Samples run with Method Blank 1 (*) and Method Blank 2 (**), respectively.

TABLE 3: Lower Columbia and Willamette River Sediment Sample Dioxin Raw Data (in pptr).

SAMPLE SITE	TOC	2378 TCDF	TOTAL TCDF	2378 TCDD	TOTAL TCDD	12378 PeCDF	23478 PeCDF	TOTAL PeCDF	12378 PeCDD	TOTAL PeCDD	123478 HxCDF	123678 HxCDF	123789 HxCDF	234678 HxCDF	TOTAL HxCDF	123478 HxCDD	123678 HxCDD	123789 HxCDD	TOTAL HxCDD	1234678 HpCDF	1234789 HpCDF	TOTAL HpCDF	1234678 HpCDD	TOTAL HpCDD	OCDF	OCDD
CR-GC-2 *	6.10	-2.00	ND	-5.40	ND	-2.00	-1.20	ND	-1.40	ND	-0.97	-1.70	-2.00	-3.50	5.10	-1.60	-3.20	-4.20	ND	-6.20	-7.10	ND	9.70	20.00	-21.00	120.00
CR-GC-4(EPA) *	0.62	0.80	1.10	-0.38	3.50	-0.20	-0.16	ND	-0.17	ND	-0.20	-0.22	0.27	-0.08	0.49	-0.11	0.28	-0.27	1.60	0.48	-0.12	1.30	2.90	5.00	0.66	25.00
CR-GC-5 **	1.60	0.37	0.37	-0.32	ND	-0.13	-0.13	ND	-0.17	ND	-0.11	-0.29	0.28	-0.12	0.28	-0.18	-0.23	-0.31	0.93	-0.25	-0.65	ND	1.30	2.80	-0.67	14.00
CR-GC-6 *	7.50	2.00	2.00	-1.50	ND	4.10	3.60	7.70	3.80	3.80	4.50	3.80	4.10	4.20	17.00	4.50	3.50	2.30	10.00	5.40	5.50	11.00	7.10	7.10	15.00	54.00
CR-VC-12A ** / CR-VC-12B **	0.84	0.89	2.90	-0.42	0.42	0.24	-0.14	2.20	0.18	0.48	0.48	0.33	0.37	-0.14	3.90	0.26	2.10	0.77	11.00	1.80	-0.56	5.60	25.00	46.00	4.40	220.00
CR-GC-15 *	0.30	0.80	0.80	-0.70	2.20	-0.45	-0.70	ND	-0.54	ND	-0.23	-0.35	0.57	-0.61	0.57	-1.10	-0.93	-0.78	ND	0.56	-0.80	1.70	2.30	4.40	3.30	29.00
CR-GC-16 *	-0.20	0.58	1.20	-0.98	0.63	-0.59	-0.39	ND	-0.24	ND	-0.80	-0.75	-1.40	-1.50	ND	-0.88	-0.99	-1.90	ND	-0.74	-3.30	ND	3.50	5.10	0.73	30.00
CR-GC-17 * / CR-GC-18 *	0.39	1.10	1.10	-0.74	3.70	-0.83	-0.68	ND	-1.20	ND	-0.47	-0.61	0.49	-0.69	0.49	-0.80	-1.00	-0.85	ND	0.47	-0.25	1.30	4.10	11.00	1.60	53.00
CR-GC-23 ** / CR-GC-24 **	1.10	-0.57	ND	-0.46	ND	-0.06	-0.18	ND	-0.25	ND	-0.23	-0.18	-0.28	-0.27	ND	-0.43	-0.29	-0.25	ND	-0.27	-0.21	ND	1.50	1.50	-0.41	8.60
CR-GC-25 ** / CR-GC-26 **	-0.20	0.43	0.43	-0.45	ND	-0.09	-0.10	ND	-0.05	ND	-0.13	-0.07	0.22	-0.10	0.22	-0.25	-0.22	-0.36	0.31	-0.62	-0.13	0.67	2.80	5.80	0.97	45.00
MINIMUM	0.30	0.37	0.37	0.00	0.42	0.24	3.60	2.20	0.18	0.48	0.48	0.33	0.22	4.20	0.22	0.26	0.28	0.77	0.31	0.47	5.50	0.67	1.30	1.50	0.66	8.60
MAXIMUM	7.50	2.00	2.90	0.00	3.70	4.10	3.60	7.70	3.80	3.80	4.50	3.80	4.10	4.20	17.00	4.50	3.50	2.30	11.00	5.40	5.50	11.00	25.00	46.00	15.00	220.00
WR-GC-2 **	2.40	19.00	49.00	-0.58	4.30	24.00	10.00	84.00	-1.50	ND	-62.00	11.00	4.30	1.50	140.00	2.70	21.00	11.00	140.00	67.00	12.00	260.00	380.00	710.00	230.00	2,700.00
WR-GC-3A * / WR-GC-3B *	4.00	22.00	91.00	-8.70	34.00	24.00	18.00	240.00	-7.50	3.80	-130.00	19.00	11.00	-3.80	770.00	7.60	38.00	20.00	340.00	29.00	1,300.00	1,300.00	1,500.00	3,400.00	1,300.00	13,000.00
WR-GC-4 **	2.80	110.00	270.00	0.63	4.40	360.00	61.00	680.00	1.20	1.20	700.00	150.00	25.00	18.00	1,200.00	1.20	17.00	8.60	130.00	270.00	150.00	650.00	290.00	630.00	530.00	2,700.00
WR-GC-5 *	2.00	1.50	7.50	-1.40	7.20	-0.51	-1.90	22.00	0.92	0.92	4.00	-6.60	-1.20	-0.95	78.00	3.60	11.00	5.20	200.00	36.00	-3.90	140.00	440.00	1,700.00	130.00	5,400.00
WR-GC-6 *	1.40	4.40	4.40	-8.70	ND	-6.90	-6.30	ND	-20.00	ND	14.00	-10.00	-18.00	-24.00	51.00	-16.00	-21.00	-7.60	78.00	26.00	-6.60	26.00	180.00	220.00	7.90	1,700.00
WR-GC-7 **	2.50	0.73	4.40	-0.78	1.00	-0.29	-0.39	7.00	-0.78	0.46	0.90	-3.80	0.37	-0.31	29.00	0.92	2.90	1.80	27.00	14.00	1.40	15.00	130.00	270.00	72.00	1,500.00
WR-GC-7Rep **	2.00	3.50	13.00	0.62	4.50	-0.99	0.77	18.00	1.30	1.30	-3.80	1.40	1.50	-0.37	52.00	2.00	11.00	7.10	89.00	-1.80	77.00	77.00	200.00	410.00	110.00	1,800.00
WR-GC-8 *	0.90	2.30	4.70	-0.72	2.70	-0.98	-0.72	5.90	-1.30	ND	0.81	-2.00	-1.00	-0.26	25.00	0.86	6.80	2.20	40.00	10.00	-2.50	10.00	91.00	180.00	28.00	670.00
WR-GC-9 *	2.60	3.90	22.00	-1.80	7.90	-0.28	-1.10	20.00	0.87	5.30	2.50	3.90	0.79	-0.69	95.00	2.60	16.00	6.40	110.00	57.00	2.90	340.00	350.00	760.00	860.00	3,700.00
WR-GC-10 **	3.10	4.50	15.00	-1.30	3.00	-0.97	0.59	20.00	-1.50	1.40	-4.50	1.20	1.20	-0.49	47.00	2.40	17.00	6.80	110.00	19.00	-2.20	64.00	160.00	310.00	69.00	1,200.00
MINIMUM	0.90	0.73	4.40	0.62	1.00	24.00	0.59	5.90	0.87	0.46	0.81	1.20	0.37	1.50	25.00	0.86	2.90	1.80	27.00	10.00	1.40	10.00	91.00	180.00	7.90	670.00
MAXIMUM	4.00	110.00	270.00	0.63	34.00	360.00	61.00	680.00	1.30	5.30	700.00	150.00	25.00	18.00	1200.00	7.60	38.00	20.00	340.00	270.00	1300.00	1300.00	1500.00	3400.00	1300.00	13000.00
* METHOD BLANK		0.50	0.78	-0.15	ND	-0.16	-0.06	ND	-0.05	ND	-0.09	-0.16	0.29	-0.10	0.29	-0.17	-0.12	-0.20	ND	-0.18	-0.23	ND	-0.51	ND	-0.49	11.00
** METHOD BLANK		-0.52	ND	-0.26	ND	0.30	0.34	0.64	-0.30	ND	-0.36	-0.35	0.78	0.69	1.50	-0.38	-0.38	0.61	0.61	0.82	1.50	2.30	2.10	2.10	4.50	8.50

NOTE: Negative numbers (-) indicate detection limits; ND indicates None Detected; asterisk (*) relates samples to corresponding Method Blank.

TABLE 4: Lower Columbia and Willamette River Sediment Sample Dioxin 1989 TEC'S (in pptr).

SAMPLE SITE	2378 TCDF	TOTAL TCDF	2378 TCDD	TOTAL TCDD	12378 PeCDF	23478 PeCDF	TOTAL PeCDF	12378 PeCDD	TOTAL PeCDD	123478 HxCDF	123678 HxCDF	123789 HxCDF	234678 HxCDF	TOTAL HxCDF	123478 HxCDD	123678 HxCDD	123789 HxCDD	TOTAL HxCDD	1234678 HpCDF	1234789 HpCDF	TOTAL HpCDF	1234678 HpCDD	TOTAL HpCDD	OCDF	OCDD
1989 TEFs	0.10	0.00	1.00	0.00	0.05	0.50	0.00	0.50	0.00	0.10	0.10	0.10	0.10	0.00	0.10	0.10	0.10	0.00	0.01	0.01	0.00	0.01	0.00	0.001	0.001
CR-GC-2 *	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.000	0.109
CR-GC-4(EPA)	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.001	0.014
CR-GC-5**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.000	0.003
CR-GC-6 *	0.15	0.00	0.00	0.00	0.21	1.80	0.00	1.90	0.00	0.45	0.38	0.38	0.42	0.00	0.45	0.35	0.23	0.00	0.05	0.06	0.00	0.07	0.00	0.015	0.043
CR-VC-12A**	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.09	0.00	0.05	0.03	0.01	0.00	0.00	0.03	0.21	0.08	0.00	0.02	0.00	0.00	0.25	0.00	0.004	0.209
CR-VC-12B**																									
CR-GC-15 *	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.003	0.018
CR-GC-16 *	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.001	0.019
CR-GC-17 *	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.002	0.042
CR-GC-18 *																									
CR-GC-23**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.000	0.000
CR-GC-24**																									
CR-GC-25**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.001	0.034
CR-GC-26**																									
MINIMUM	0.01	0.00	0.00	0.00	0.01	1.80	0.00	0.09	0.00	0.05	0.03	0.01	0.42	0.00	0.03	0.03	0.08	0.00	0.00	0.06	0.00	0.01	0.00	0.001	0.003
MAXIMUM	0.15	0.00	0.00	0.00	0.21	1.80	0.00	1.90	0.00	0.45	0.38	0.38	0.42	0.00	0.45	0.35	0.23	0.00	0.05	0.06	0.00	0.25	0.00	0.015	0.209
WR-GC-2**	1.85	0.00	0.00	0.00	1.20	5.00	0.00	0.00	0.00	0.00	1.10	0.40	0.15	0.00	0.27	2.10	1.10	0.00	0.67	0.12	0.00	3.80	0.00	0.230	2.689
WR-GC-3A *	2.15	0.00	0.00	0.00	1.20	9.00	0.00	0.00	0.00	0.00	1.90	1.07	0.00	0.00	0.76	3.80	2.00	0.00	0.29	13.00	0.00	15.00	0.00	1.300	12.989
WR-GC-3B *																									
WR-GC-4**	10.95	0.00	0.63	0.00	18.00	30.50	0.00	0.60	0.00	70.00	15.00	2.47	1.80	0.00	0.12	1.70	0.86	0.00	2.70	1.50	0.00	2.90	0.00	0.530	2.689
WR-GC-5 *	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.40	0.00	0.00	0.00	0.00	0.36	1.10	0.52	0.00	0.36	0.00	0.00	4.40	0.00	0.130	5.389
WR-GC-6 *	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	1.80	0.00	0.008	1.689
WR-GC-7**	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.09	0.29	0.18	0.00	0.14	0.01	0.00	1.30	0.00	0.072	1.489
WR-GC-7Rep**	0.30	0.00	0.62	0.00	0.00	0.39	0.00	0.65	0.00	0.00	0.14	0.12	0.00	0.00	0.20	1.10	0.71	0.00	0.00	0.77	0.00	2.00	0.00	0.110	1.789
WR-GC-8 *	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.09	0.68	0.22	0.00	0.10	0.00	0.00	0.91	0.00	0.028	0.659
WR-GC-9 *	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.25	0.39	0.05	0.00	0.00	0.26	1.60	0.64	0.00	0.57	0.03	0.00	3.50	0.00	0.860	3.689
WR-GC-10**	0.40	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.12	0.09	0.00	0.00	0.24	1.70	0.68	0.00	0.19	0.00	0.00	1.60	0.00	0.069	1.189
MINIMUM	0.02	0.00	0.62	0.00	1.20	0.30	0.00	0.44	0.00	0.08	0.12	0.01	0.15	0.00	0.09	0.29	0.18	0.00	0.10	0.01	0.00	0.91	0.00	0.008	0.659
MAXIMUM	10.95	0.00	0.63	0.00	18.00	30.50	0.00	0.65	0.00	70.00	15.00	2.47	1.80	0.00	0.76	3.80	2.00	0.00	2.70	13.00	0.00	15.00	0.00	1.300	12.989
* BLANK BATCH 1	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.011
**BLANK BATCH 2	0.00	0.00	0.00	0.00	0.02	0.17	0.00	0.00	0.00	0.00	0.00	0.08	0.07	0.00	0.00	0.00	0.06	0.00	0.01	0.02	0.00	0.02	0.00	0.005	0.009

NOTE: Asterisk (*) relates samples to corresponding Method Blank.